

While the name was so used by Gray in 1831, it had been applied by him to the *Barbastelle* under the slightly different form *Barbastella* ten years previously. Therefore it must be retained for the genus represented by that species. The synonymy is as follows:—

BARBASTELLA, Gray, 1821.

1821. *Barbastella*, Gray, London Medical Repository, xv. p. 300.

Type *Vespertilio barbastellus*, Schreber.

1839. *Synotus*, Keyserling & Blasius, Wiegmann's Archiv für Naturgeschichte, v. Bd. i. p. 305. Type *Vespertilio barbastellus*, Schreber.

The type species is therefore

Barbastella barbastellus (Schreber).

The specific name *barbastellus* is a masculine substantive, and does not change its termination when combined with a feminine generic name.

XLVII.—*A Revision of the Species of Butterflies belonging to the Genus Teracolus, Swains.* By ARTHUR G. BUTLER, Ph.D., F.L.S., F.Z.S., &c.

IT is now upwards of twenty years since I first essayed a Monograph of this most attractive group of Pieridine Rhopalocera, and horrified my old friend Hewitson by adding nearly fifty species to those already described. Since that date many beautiful new forms have been received from various parts of Africa and from Arabia.

Until quite recently the variation of the species of *Teracolus* has been but little studied, very few facts bearing upon the seasonal modifications of the different forms having been published. It is true that so far back as 1877 Mr. Mansel Weale (Trans. Ent. Soc. 1877, pp. 273-5) proved by experiment that *T. keiskamma* and *T. auxo* were produced from exactly similar larvæ and pupæ found upon a *Cadaba* bush in autumn and spring, and he suggested that they were variations influenced by the amount of moisture at the season of their emergence. This suggestion, however, was received with a good deal of scepticism.

In vol. viii. of the 'Journal of the Bombay Natural History Society' Capt. E. Y. Watson, of the Indian Staff Corps, published an article on the synonymy of some species of Indian Pieridæ, in which he reduced the Oriental *Teracoli* to

twelve, expressing his firm conviction that all the other described forms were seasonal. So revolutionary a measure naturally met with considerable opposition at first, and is even now laughed to scorn by some lepidopterists; but each collection received from the tropical parts of the Old World tends to prove that certain laws regulate the seasonal modification of Pierine butterflies and are never departed from.

In the wet season Pierinæ are heavily marked with black spots, borders, and sometimes veins, often on both surfaces (though especially above); the under surface has a white or yellow ground-tint. In the dry season the under (and sometimes the upper) surface shows much less black marking, and is frequently suffused with clay-colour, ochreous, or rose-red; frequently, but especially when the ground-tint remains white, the apical area of the primaries and the whole surface of the secondaries are irrorated or finely striated with brown.

The seasonal character of the above differences has been amply proved as regards the species of *Teracolus*, so that it is now possible to recognize a dry- or a wet-season form at sight; nor is the fact that dated examples have been critically examined by any means the only evidence upon which conclusions have been based, or even the unhesitating declarations of collectors in India and Africa, for in some cases the one form has been bred from eggs laid by the other, *T. auxo* having been proved recently by Mr. Guy A. K. Marshall to be the wet-season form of *T. keiskamma*, as supposed by Mr. Mansel Weale.

Col. Charles Swinhoe objected to Capt. Watson's decisions respecting the seasonal forms of certain Eastern *Teracoli* on the ground that he took them all flying simultaneously at Karachi—a fact which can be proved by an examination of the dates on the labels even of the Museum examples. It must, however, be borne in mind that in countries where practically no wet season exists great variation is often to be found, as pointed out by me in the case of *Limnas chrysippus*, *Catopsilia florella*, &c. (Proc. Zool. Soc. 1884, pp. 478–503), which there retain all the forms as simple sports of one variable species which in other parts of the Old World become fixed as local types. In like manner I find that phases answerable to dry-, intermediate, and wet-season forms exist in many species of Karachi and Arabia, and are simultaneously produced. As an instance, Capt. Nurse bred *T. Yerburii* and *T. evagore* from a series of exactly similar larvæ, the perfect insects emerging at the same season.

Again, lest it should be supposed that the yellow or ochraceous under-surface coloration was of specific importance, it

is noteworthy that the Arabian *T. phisadia* has a male of the wet-season phase and a female of the dry type; also that the nearly allied *T. puellaris* occurs at Karachi with males both of the wet and dry phases, but females of the dry phase only.

Another point which proves the seasonal character of these different variations, wherever seasons can be said to exist, is that an unusually wet country invariably increases the wet characteristics, and an unusually dry country has the same effect upon the dry type of the species; thus the dry form of *T. subfasciatus* from the Nyasa-Tanganyika plateau, where the country is almost a desert in the dry season (though extremely moist during the rains), is much more emphasized than it is in southern South Africa, so much so that it was described as a different species.

In the spring of 1896 Mr. Guy A. K. Marshall, one of the most painstaking and indefatigable collectors who has visited the so-called "Dark Continent," came to the Museum with the view of applying the experience gained by him in Mashunaland to the magnificent collection under my charge. Finding how rich we were in both examples and species of the genus *Teracolus*, and observing that the wet and dry forms were at that time kept separate as distinct species, Mr. Marshall made up his mind to thoroughly revise the synonymy of the genus. Had he waited until I had rearranged our material, which was cumbered by masses of only half-determined specimens (so crowded together that the labels could with difficulty be distinguished), he might have produced a really satisfactory memoir. As, however, he elected to go to work upon the genus in its crowded condition, it is not surprising that his synonymic work is not only more or less overdone, but in some cases confounds species appertaining to widely distinct groups. At the same time much that Mr. Marshall has suggested in his paper (Proc. Zool. Soc. 1897) is undoubtedly correct, and perhaps the fact that the work of this reviser calls loudly for revision in certain points may have been beneficial as inciting me to especial care in studying the sexes and seasonal forms, with due regard to the geographical range of each species, in order that I might not only straighten out the inequalities which certainly exist, but avoid the error of making confusion worse confounded. How far I have succeeded future students of the genus will have to decide. It is probable that some forms which I have not seen any justification for suppressing may yet prove not to be good species, and it may be that in one or two cases I may, like my friend Mr. Marshall, have gone a little too far.

1. *Teracolus amatus*.

Papilio amatus, Fabricius, Syst. Ent. p. 476 (1775).

Papilio calais, Cramer, Pap. Exot. i. pl. liii. C, D (1779).

Papilio cypræa, Fabricius, Mant. Ins. ii. p. 22 (1787).

Papilio dynamene, Klug, Symb. Phys. pl. vi. figs. 17, 18 (1829).

Teracolus modestus, Butler, P. Z. S. 1876, p. 137.

Teracolus carnifer, Butler, t. c. p. 138, pl. vii. figs. 8, 9.

Teracolus Kennedii, Swinhoe, P. Z. S. 1884, p. 440.

Wet-season form *T. calais* (= *dynamene*).

Occurs over a great part of tropical Africa, from the Congo westwards to the Zambesi eastwards, whence it ranges northwards towards the eastern coast to Abyssinia, passing through the Sabaki valley, Somaliland, whence it probably crosses over to Arabia, and thence through Syria and Persia to North-western India. The most vividly coloured specimens are those received from the Congo and Angola, but they grade imperceptibly into the lightest examples of *T. dynamene*, whilst the latter also grade into the following, from which many attempts have been made to keep them distinct, even by Mr. Guy A. K. Marshall in his recent review of the synonymy of *Teracolus*:—

T. amatus (= *cypræa* = *modestus* = *Kennedii*).

This is merely a more southern development of *T. calais* in India and Ceylon, most examples differing in the smaller black discocellular spot on the primaries, the Ceylonese examples (*T. modestus*) also generally with a heavier black border; but intermediate specimens exist which, to my mind, render it impossible to keep them apart. Roughly speaking, *T. amatus* may be said to range throughout the plains of Central and Southern India, occurring as *T. modestus* in Ceylon. *T. cypræa* is the white form of the female.

Dry-season form *T. carnifer*.

From Arabia through Persia to Karachi. In Central and Southern India and Ceylon it is represented by a much larger and more heavily bordered form, a white female to which sometimes occurs.

Altogether the Museum series is represented by ninety-seven specimens.

2. *Teracolus protractus*.

Teracolus protractus, Butler, P. Z. S. 1876, p. 137.

Described from a dry-season example obtained in the Punjab; it occurs commonly at Campbellpore, Beluchistan, and Kutch.

The wet-season variety has the apex of the primaries and the secondaries greenish yellow instead of pinky buff on the under surface; intermediate specimens also occur, and it may be doubted whether the three forms do not all fly simultaneously, as is frequently the case in very dry regions.

There are altogether seventeen specimens in the Museum series.

3. *Teracolus ocellatus*.

Teracolus ocellatus, Butler, P. Z. S. 1885, p. 767.

A single wet-season male of this still rare species was obtained by Mr. J. G. Thrupp in Somaliland in 1884; I have since seen a second example in Miss E. M. Sharpe's collection. I had long expected to see this butterfly before it actually came to hand, as I felt certain that some intermediate form must exist between the salmon-coloured *T. protractus* and the half-salmon, half-white *T. phisadia*. As might be expected, *T. ocellatus* is somewhat nearer to *T. phisadia* than to the Indian species, both in outline and in the general pattern of the primaries. The dry-season form is at present unknown, but it is quite possible that, as in *T. phisadia*, it may only represent the female phase of the species.

4. *Teracolus phisadia*.

Teracolus phisadia, Godart, Enc. Méth. ix. p. 132 (1819).

Pontia arne, Klug, Symb. Phys. pl. vii. figs. 1-4 (1829).

Idmais philamene, Mabille, C. R. Ent. Belg. xxxiii. p. cvi (1880); Grand. Madag. p. 284, pl. xli. figs. 10, 10a (1887).

The male of this species is a wet-season form and the female (in all its varieties) invariably dry-season; of course they all fly together at the same time. The species occurs abundantly in Arabia and ranges to Syria. According to Mr. Marshall it also occurs through Abyssinia to Senegal, but I have never seen an African specimen; its reputed occurrence in Madagascar is doubtless due to an error in the labelling of a collection from Aden containing single examples of many species which have been thus included in M. Grandidier's splendid work by M. Mabille. It would, indeed, be remarkable if Adenese species could leap over Somaliland and the intermediate sea to Madagascar without appearing upon the African continent.

5. *Teracolus puellaris*.

Teracolus puellaris, Butler, P. Z. S. 1876, p. 136.

Teracolus ochreipennis, Butler, t. c. p. 136.

Teracolus rorus, Swinhoe, P. Z. S. 1884, p. 437, pl. xxxix. fig. 8.

Occurs from Kuteh, through Karachi, through Sind north-

wards as far as Beluchistan, both dry- and wet-season forms flying together; the form with yellow under surface, which is the wet-season representative, is *T. puellaris*, and that with the apex of primaries and the whole of the secondaries sandy buff on the under surface, which is the dry-season type, is *T. ochreipennis* (= *T. rorus*). We have both forms captured on the 29th of June and in November. It is therefore evident that, as in some other dry localities, the seasonal forms in this species represent mere varieties which appear simultaneously. Among Hewitson's examples of *T. phisalia* is a male of the wet-season form labelled "Aden"; but this must surely be an error, unless the white females referred to *T. phisalia*, and obtained at my request by Col. Yerbury, flying with the latter species, actually belong to the dry-season variety of *T. puellaris*. This, however, is extremely improbable*.

6. *Teracolus vestalis*.

Teracolus vestalis, Butler, P. Z. S. 1876, p. 135, pl. vii. fig. 10.

Teracolus intermissus, Butler, P. Z. S. 1883, p. 152, pl. xxiv. fig. 4.

Teracolus peelus, Swinhoe, P. Z. S. 1884, p. 433, pl. xxxix. fig. 9.

Teracolus dubius, Swinhoe, t. c. p. 439.

Occurs from Kutch through Karachi and Beluchistan to the coast of Persia. The varieties representative of seasonal forms in this species fly together in April, May, and June; but we have only received the dry-season types as obtained in November and December. The wet-season type is typical *T. vestalis* (= *T. dubius*); the dry and intermediate types are represented by *T. intermissus*, of which *T. peelus* is only a yellow female form, Swinhoe's supposed male being merely a small example.

7. *Teracolus castalis*.

Idmais castalis, Staudinger, Exot. Schmett. p. 43, pl. xxiii. (1884).

Originally described from an imperfect example obtained at Taita, E. Africa; it has subsequently been received from Mombasa and from Somaliland. In the Museum there is one male from Mombasa of the typical wet-season form.

T. castalis is the African representative of *T. vestalis*, from which the longer costa of the primaries, the broader black apical and costal borders of these wings, and the distinctly spotted border of the secondaries readily distinguish it.

* Hewitson's utter disregard of the importance of correct habitats is evidenced by the fact that fully half his specimens bear no indication of locality.

8. *Teracolus Johnstoni*.

Teracolus Johnstoni, Butler, Ent. Month. Mag. xxiii. p. 29 (1886).

Teracolus eris (part.), Trimen, South Afr. Butt. iii. p. 93 (1889).

Ranges in South Africa from Graham's Town to Natal, beyond which point it is probably replaced by *T. opalescens*. It is one of the smallest of the *T. eris* group, being (in its largest examples) only slightly superior in size to the typical form, from which it differs in its more elongated primaries, the more elongate form of the white area on these wings and of the apical ochraceous streaks or internervular spots, the less heavily bordered inner marginal black border on the primaries of the female, and the more abruptly terminated black costal band on the secondaries, which emits an acute streak to the apex along the costa, instead of being extended transversely as most to the radial vein.

9. *Teracolus eris*.

Pontia eris, Klug, Symb. Phys., Ins. pl. vi. figs. 15, 16 (1829).

♀. *Idmais fatma*, Felder, Reise der Nov., Lep. p. 189, pl. xxv. fig. 3 (1865).

♀. *Teracolus abyssinicus*, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. xviii. p. 486 (1876).

Ranges northwards from the Sabaki valley and Kilimanjaro to Abyssinia and Nubia, and westwards to Kordofan. The *Idmais fatma* of Felder is the dry-season form of the female.

10. *Teracolus opalescens*.

♀. *Teracolus opalescens*, Butler, Ent. Month. Mag. xxiii. p. 30 (1886);
♂. P. Z. S. 1896, p. 125.

Ranges from Delagoa Bay inland and northwards through Nyasaland to the Victoria Nyanza.

This species attains to a greater size than any of the other forms of the *T. eris* group; it is also the most heavily black-bordered of them all, and has well-defined black marginal spots to the secondaries in both sexes; the white irregular edging to the external angle and lower portion of outer margin of primaries, which is usually well marked in *T. Johnstoni*, is absent, as in *T. eris*. The primaries below have much larger discal black spots than in either of the latter species and three or four marginal black dots, whilst the secondaries have a much broader orange-yellow costal streak and traces of a discal transverse yellow streak from its extremity, also a bright saffron-yellow internal streak; the female has the usual discal internervular series of dots on the under

surface of the secondaries, but the male dry-season form never shows the conspicuous discocellular black spot which characterizes the male of typical *T. Johnstoni*.

Mr. Guy A. K. Marshall, who calls the species *T. opalinus* and sinks it as a synonym of *T. eris*, says that the type is an unusually large female from Delagoa Bay. Of our eight females three ought to be called unusually large, four fairly large, and one rather small; but the name *opalescens* was given to the type because it is faintly opalescent on the upper surface and on the under surface of the primaries, a character which I have since discovered to be inconstant, as also is the width of the internal black bordering of the primaries, which is frequently as wide again as in the type. The dry-season form is smaller than that of the wet-season, the primaries comparatively shorter and broader than in *T. Johnstoni*, with the conspicuous black discal spots below which characterize the wet-season form, and with a series of scaly brown spots across the under surface of the secondaries between the nervures. These characters and the lack of the black discocellular spot readily distinguish it from the dry form of the southern species.

11. *Teracolus maimuna*.

Idmais maimuna, Kirby, Proc. R. Dubl. Soc. (2) ii. p. 338 (1880);
Waterhouse, Aid Ident. Ins. ii. pl. cxliii. figs. 1, 2 (1882-90).

The figures of this species are very poor and convey a false impression of it. The range of *T. maimuna* appears to extend on the West Coast from Senegal to Angola; it is a large form, although small examples occasionally are to be found. Of our seven females, one from Angola is larger than the type of *T. opalescens*, whilst the dry-season females are quite small.

This West Coast representative of *T. eris* is at once recognizable in the male sex by the dull smoky character of the apical patch, the spots on which are small and less solid in colouring than in any of the other types; the white area on the primaries is also much broader and terminated less irregularly, the margin of the secondaries is more or less spotted at the extremities of the veins. The wet-season form may always be distinguished from males of *T. opalescens* (in addition to the dullness of the apical patch) by the almost total absence of orange colouring from the under surface of the secondaries, whilst some examples show a discal series of dusky spots across the secondaries; the intermediate season form, which we have chiefly from Senegal, has a well-defined orange costal streak below and a faint trace of a saffron-yellow

internal streak, the under surface varying from pale buff to lemon-yellow. The females much resemble those of *T. opalescens*, but the ground-colouring of the under surface is yellower and the discal spots on the secondaries much more prominent, whilst the orange costal streak is paler. In the dry-season form of the female, apart from the slightly more sandy reddish colouring of the apex and of the secondaries, the absence of subapical spots and of the internal stripe on the upper surface, and the presence of a transverse tapering brown streak from the costa of secondaries on the under surface, serve to distinguish it from females of *T. opalescens*.

12. *Teracolus subfasciatus*.

Teracolus subfasciatus, Swainson, Zool. Ill., Ins. ii. pl. cxv. (1823).

Ptychopteryx Bohemani, Wallengren, Lep. Rhop. Caffr. p. 18 (1857).

Ptychopteryx? ducissa, Dognin, Le Naturaliste, p. 132 (1891).

The range of this species is much greater than was formerly supposed. It occurs in Damaraland and Ovampoland, Eastern Griqualand, Northern Transvaal, Matabeleland, Zanguebar, Nyasa, and Uganda.

From the rarity of the dry-season form, it seems probable that it is confined to the drier parts of Eastern and East Central Africa. The female is the sex described by M. Dognin; the male is brimstone-yellow like the wet-season form, but with a clear orange apical patch. Hewitson has two examples of the female from the Transvaal, but the orange area on the upper surface of the primaries is somewhat more restricted in these than in our Nyasa female.

13. *Teracolus elgonensis*.

Teracolus elgonensis, E. M. Sharpe, P. Z. S. 1891, p. 191, pl. xvi. fig. 6 (1891).

Mount Elgon, north of Victoria Nyanza.

I have only seen the type of this beautiful little species.

14. *Teracolus eunoma*.

Pieris eunoma, Hopffer, Ber. Verh. Akad. Berl. 1855, p. 640; Peters's Reise n. Mossamb., Zool. v. p. 353, pl. xxiii. figs. 1, 2 (1862).

Querimba, Mozambique.

This is a wet-season form, and is not at all likely to be a mere variety of *T. chromiferus*, which also is a wet-season form occurring about 200 miles further northward. The species is only known to me at present through the admirable figure in Dr. Peters's work; but I am satisfied that it is just as distinct as *T. elgonensis*.

15. *Teracolus chromiferus*.

Teracolus chromiferus, Rothschild, Novit. Zool. vol. i. p. 533 (1894).

Most frequently received from Zanzibar, from which locality we have a pair from the Godman and Salvin collection; the example in Hewitson's collection is also from this locality. It, however, occurs southwards certainly as far as the Zambesi River, and, according to Marshall, even as far as Beira, whilst Dr. Ansorge obtained it in German East Africa.

16. *Teracolus puniceus*.

Teracolus puniceus, Butler, P. Z. S. 1888, p. 72, 1894, p. 573, pl. xxxvi. figs. 5, 6.

The wet-season form of this species has recently been received from Mni, near Mombasa; it is slightly larger than the typical dry-season form, and the magenta-red extends a little further along the costa, but not upon the outer margin; the veins above are more heavily blackened and terminate in black marginal dots; on the under surface the apex of primaries and the whole of secondaries are creamy buff, the costa of secondaries narrowly saffron-yellow towards the base, and the transverse ray is either absent or represented by black-brown dashes. The female is either white or bright yellow above, and greyish lavender or yellow, sparsely irrorated with greyish, below; the markings are somewhat similar to those of *T. hetæra*, but the borders perhaps rather less heavy, more nearly resembling the dry-season females of that species. *T. puniceus* ranges from Wadelai through the Victoria Nyanza south-eastward to Mombasa.

17. *Teracolus hetæra*.

♂. *Callosune hetæra*, Gerstaecker, Arch. für Naturgesch. 1871, i. p. 357; Van der Decken's Reisen in Ost-Africa, iv. 2, p. 365, pl. xv. fig. 2 (1873).

♀. *Teracolus foliaceus*, Butler, P. Z. S. 1894, p. 573, pl. xxxvi. fig. 7.

The range of *T. hetæra* appears to be from the Sabaki valley southwards to Zanzibar, meeting with *T. puniceus* at Mombasa only.

T. foliaceus is a dark form of the wet-season female; the dry-season male chiefly differs from that of the wet-season in the less-defined black veining and marginal dots and in the rosy under surface; the secondaries show faint traces of a transverse bar. A pair of this form was in the Godman and Salvin collection.

Mr. Marshall's supposition that *T. puniceus* would prove to be the dry-season form of *T. hetera* is thus shown to be incorrect; personally I never accepted it as even a probability, for it is rare to find so great a difference in the character of the apical patch in this group of *Teracolus*.

18. *Teracolus Lorti*.

Teracolus Lorti, E. M. Sharpe, P. Z. S. 1896, p. 527.

This very distinct little species, of which the Museum at present possesses two males only, appears to be confined to Somaliland and Gallaland, the dry-season form only being known.

In *T. Lorti* the magenta apical patch reaches the greatest development, extending along the costal nervure to a point opposite to the upper extremity of the discoidal cell. This patch is not of the same colour as in the other species of the group, being duller and more lilacine in tint. The idea of this pretty little species being a variety of either *T. hetera* or *T. puniceus* is quite out of the question.

19. *Teracolus regina*.

Anthocharis regina, Trimen, Trans. Ent. Soc. ser. 3, vol. i. p. 520 (1863).

Teracolus regina, Trimen, South Afr. Butt. iii. pl. xi. fig. 3 (1889).

Callosuneanax, Grose Smith, Ann. & Mag. Nat. Hist. ser. 6, vol. iii. p. 125 (1889); Rhop. Exot. i., *Call.* pl. i. figs. 5-8 (1889).

Teracolus eliza, E. M. Sharpe, Ann. & Mag. Nat. Hist. ser. 6, vol. v. p. 441; Waterhouse, Aid Ident. Ins. pl. clxxxix. (1890).

The most northerly examples of this species were those obtained in the neighbourhood of the Albert Nyanza by the late Emin Pasha; thence it extends southwards along the eastern side of Africa through Nyasaland and the Zambesi district to the Transvaal*, and to the west it passes through the Bechuana country to Namaqualand and Damaraland. *T.anax* (= *eliza*) is the wet-season form.

20. *Teracolus imperator*.

Teracolus imperator, Butler, P. Z. S. 1876, p. 132.

Anthocharis ione, Reiche (not Godart), Ferret and Galinier, Voy. Abyss. pl. xxx. figs. 1, 2, 5-7 (1849).

The range of this species appears to be from Wasin Island through Zanzibar south-westwards, just touching Nyasaland,

* One of Hewitson's examples is even labelled as from Kaffirland, but this may be an error.

to the Transvaal; but the evidence of its occurrence in Nyasaland is based solely upon two female examples in the Hewitson cabinet, and it is well known that Hewitson attached so little value to the habitat of a species, that not much reliance can be placed upon his labelling. However, there is no reason why the distribution of this species should not run parallel to that of *T. phlegyas* through part of its range. That it is the same species, as urged by Mr. Marshall, I do not believe, for it differs both in its wet- and dry-season forms. The dry form of *T. imperator* has the purple apical belt narrower, with less black inner edging, and the under-surface colouring is mostly rosy, without transverse bar.

21. *Teracolus phlegyas*.

Anthocharis phlegyas, Butler, P. Z. S. 1865, p. 431, pl. xxv. figs. 3, 3a.

Euchloe coliagenes, Butler, Ann. & Mag. Nat. Hist. ser. 3, vol. xx. p. 216, pl. iv. figs. 4, 5 (1867).

Euchloe jalone, Butler, Cist. Ent. i. p. 14 (1869).

The types are all from the White Nile, and I am not at all sure that the larger and more heavily marked types which occur considerably further to the south ought not to be kept distinct from them; but until they have been bred it will, perhaps, be safer to regard them as mere local races of one widely distributed species. At the same time it is doubtful whether the species occurs all along the line from the White Nile to Nyasaland or thence southward to Delagoa Bay; and if a name had already been given to the more southern type, I should certainly have regarded it worthy of respect. As it is, there is so much general resemblance between the wet-season male from Nyasa and the dry-season male from the White Nile in the pattern and colouring of the upper surface, that I hesitate to insist upon keeping them separate.

Teracolus coliagenes, which Mr. Marshall regarded as linking the *T. eris* and *fausta* groups, is certainly nothing more nor less than the wet-season female of typical male *T. phlegyas*; the female which I described is the dry-season type, and therefore is that sex of *T. jalone*.

T. phlegyas, in all its forms, can be distinguished from *T. imperator* by its somewhat inferior size, the whitish scaling in spots upon the apical border of the males, and the transverse bar on the under surface of the secondaries usually more broken up. The females are much less heavily marked on the upper surface.

22. *Teracolus Buxtoni*.

Teracolus Buxtoni, Butler, P. Z. S. 1876, p. 130.

Callosune jalone, var. *natalensis*, Staudinger, Exot. Schmett. p. 44 (1888).

Natal.

The wet-season form of this local representative of *T. phlegyas* comes nearer to *T. ione*, only the male has a very strongly defined blackish stripe across the under surface of the secondaries; the female has the subapical white spots small and greyish in colouring and the basal area very dark, whilst the bar on the secondaries is more strongly marked and the spots of the marginal border extend further up the nervures. This is the *T. natalensis* of Staudinger*.

The dry-season form is represented by *T. Buxtoni*, of which we only possess a pair in the general series, but of which there are four others in the Hewitson collection. In this form the upper surface of the male resembles that of the wet-season type of *T. phlegyas*, but the female nearly approaches the dry-season form of the same.

23. *Teracolus ione*.

Picris ione, Godart, Enc. Méth. ix. p. 140 (1819).

Anthocharis erone, Angas, Kaff. Ill. pl. xxx. fig. 3 (1849).

Anthopsyche speciosa, Wallengren, Lep. Rhop. Caffr. p. 16 (1857).

Euchloe jobina, Butler, Cist. Ent. i. p. 14 (1869).

I quite agree with Mr. Marshall that the argument used by my friend Mr. Trimen, that no Europeans lived in Natal when this species was described, is insufficient evidence to authorize the application of the name *T. ione* to a species which does not at all answer to M. Godart's description. This is the only species which can be correctly described as "antecis suprâ apice (medio violaceo) nigris," which M. Godart further explains thus:—"Les premières ont à l'extrémité une bordure noire arquée, étroite vers l'angle interne, large vis-à-vis du sommet, où elle est divisée transversalement et obliquement par une bande violette, très-brillante, arrondie en dehors." The description of the under surface of the hind-wings with "some blackish marginal dots" is not applicable to *T. jalone* or any of the forms of *T. phlegyas*, but only to

* This author, judging me by himself, makes some quite uncalled for remarks about *T. jalone* and *T. jobina*. Considering that I had three or four collections at my disposal when I described them, it would be odd if his statements were true.

this species and, in a less degree (sometimes), to *T. imperator*, and the single costal spot, which Godart does not specially mention, may easily have been reckoned by him as one of these marginal spots. Lastly, the white colouring of the under surface, upon which stress has been laid, is really of very little importance, for worn examples, or such as had been long on the wing, would show little if any yellow tinting. There is no accounting for the presence of many of the rare species which found their way into the collections of the older authors, often not to reappear for a hundred years or longer. As regards the argument as to Boisduval having seen M. Godart's type, it is evident, from what Mr. Trimen says, that the late Doctor confounded all the purple-tipped *Teracoli* together*. *T. jobina* is the dry-season form of the species, and the description was based upon four examples in the collection of Mr. Druce from Natal. These subsequently came into the possession of Messrs. Godman and Salvin, whose series of eleven specimens (inclusive of the above) is now in the Museum collection. An intermediate season form long represented *T. jobina* in the Museum, but three specimens in the Hewitson collection are typical.

24. *Teracolus bacchus*.

Teracolus bacchus, Butler, P. Z. S. 1888, p. 73; Grose Smith and Kirby, Rhop. Exot. i., *Call.* pl. i. figs. 1-4 (1889).

Callosune mrogoana, Vieillot, Bull. Soc. Ent. France, 1891, pp. ci and cxv.

Ranges from Lado, north of the Albert Nyanza, southwards to Mamboia and the Nguru hills, and eastwards to Kilima-njaro.

The wet-season form is characterized as distinct from *T. imperator* by its inferior size, the heavy black veining on both surfaces, the well-defined grey internervular spots on the apical border of the primaries in the male, and the rudimentary character of the transverse band on the under surface of the secondaries in that sex; it possesses also two forms of female, as is the case with *T. ione*. The dry-season male is somewhat larger, with the black veins much less defined above and almost or altogether wanting below, the black marginal spots also wanting on the upper surface of the

* This has been further proved by Mons. Dognin, who has kindly examined the original examples for me, but has been unable to decide which is the type of M. Godart's description, or even if it still exists in the series.

secondaries. Our two male examples of this form are not quite fresh, and therefore the colouring below is not very defined, but it does not seem ever to have been rosy. It is possible, therefore, that a still drier type may remain to be discovered.

[To be continued.]

BIBLIOGRAPHICAL NOTICES.

The Life-Histories of the British Marine Food-Fishes. By WILLIAM CARMICHAEL M'INTOSH, F.R.S., Professor, and ARTHUR THOMAS MASTERMAN, Assistant Professor of Natural History in the University of St. Andrews. 8vo. London, 1897. Pp. xvi, 516. Frontispiece, 20 coloured plates, and 45 woodcuts.

ST. ANDREWS (now "The Gatty"*) MARINE LABORATORY has distinctly forged ahead in the issue of this volume, which is alike creditable for its clear graphic style and excellence of illustration. It is just such a handbook as those interested in practical ichthyology—and particularly the new band of students at work in marine laboratories—should have at hand for easy reference and instruction. It will save much groping for literature scattered through many scientific journals &c., home and foreign—a kind of ready reckoner in its way. In the preface the authors specify their respective shares in the labour, the major part of which comprises records of work accomplished at "The Gatty" itself—and a goodly show it makes of "north of Tweed" fish science (*perfervidum ingenium Scotorum*).

Stress is justly laid on Sars's discovery of floating eggs—truly the starting-point of much of the subsequent ichthyological research. They remark how difficult it is "to predicate from the habits of a fish the nature of its eggs."

Three propositions are laid down with respect to the pelagic eggs. Their pelagic character:—(1) "leads to the dispersion of the species throughout the ocean"; (2) "tends to minimize the destruction of the eggs by any special agency"; (3) "appears to have played an important part in the preservation of the various food-fishes." The first result is due to the effects of oceanic currents and tides; the second to the relative invisibility of the eggs; and the third to the lengthening of spawning discharge and very numerous diminutive eggs. Howsoever these may be active agents, it nevertheless seems to us to follow that the essential differences, together with the greater fecundity of the pelagic, as contradistinguished from the

* In courtesy to Dr. Charles H. Gatty, whose handsome gift of a new building has infused fresh life to the institution.